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Supreme Court of the United States

October Term, 1935

No. 147

MAGNET REED AND TELEGRAPH COMPANY, INC.
Petitioner,

vs.
RADIO CORPORATION OF AMERICA
Respondent.

REPLY BRIEF FOR PETITIONER

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IN THE

Supreme Court of the United States

October Term, 1938

No. 127

MACKEY RADIO AND TELEGRAPH COMPANY, INC.,
Petitioner,

vs.

RADIO CORPORATION OF AMERICA,
Respondent.

REPLY BRIEF FOR PETITIONER.

Respondent's brief (*e. g.* p. 15) makes it perfectly clear that all that the Carter patent purports to add to the prior Lindenblad V-antenna patent (Vol. II, p. 486) is, as stated in our main brief (p. 16), the means for determining the *specific* angle of the V, to obtain the *greatest* concentration of radiation in the plane of the wires and along the bisector of the V.

Respondent's brief likewise makes it clear that the only manner in which this angle can be determined is by a mathematical formula, either as *accurately* stated (*e. g.* claims 9 *et seq.*) or as *empirically* stated (*e. g.* claims 15 *et seq.*).

Thus, the conclusion is inescapable that Carter's sole contribution is a mathematical formula. Indeed, that was the sole inventive idea stressed in the Carter application to secure its allowance over the prior Lindenblad patent

(see our main brief, p. 20), and advanced by respondent's expert at the trial of the case (Vol. I, p. 122, fol. 178; see also the decision of the District Court, Vol. II, p. 1145, fol. 1362, quoted in our main brief, pp. 15 and 16).

Because it was conclusively proven that the mathematical formula was originated and published by Abraham, respondent *now* admits that the mathematical formula was not Carter's invention. Indeed, the formula is now disavowed, and the statement is made (p. 52):

"We have *always* asserted that what Carter invented was an *antenna*. He merely utilized the Abraham formulas in mathematically analyzing and explaining a theory of results he got from his new structure. Carter did not patent or attempt to patent any formula." (Emphasis respondent's.)

The formula being the *only* thing which purports to differentiate the Carter patent from the prior Lindenblad patent, respondent seeks to minimize the foregoing admission by contending that the *empirical* statement of the formula in claims 15 and 16 here in suit substantially and materially differs from the Abraham formula. The Carter patent makes no such distinction. Indeed, the Abraham formula literally forms the subject matter of some of the claims of the patent originally in suit but now abandoned. This fact alone completely refutes respondent's assertion, quoted above, that—

"Carter did not patent or attempt to patent any formula."

Besides, as we have pointed out in our main brief (pp. 43, 44), it has been conclusively established that the reduction of a rigorous mathematical formula into *empirical* form is an every day occurrence in all lines of engineering;

the latter can be no more accurate than the rigorous formula from which it is derived.

In consequence, this case and this brief could stop here. However, because respondent has unwarrantedly criticized portions of petitioner's main brief, and has advanced arguments built on premises for which there is no foundation in fact or in the record, we feel compelled to make comment thereon in the order in which they appear in respondent's brief, for fear our silence will be misunderstood.

Respondent's criticism of our "Statement of the Case"
(Brief pp. 2-4).

Respondent advances a number of enumerated criticisms, the first three of which imply that this Court should disregard matters that for years have been of public as well as of judicial knowledge. Respondent is notoriously the active head of the so-called "Radio Trust" or "Patent Pool", as this and other courts have frequently had occasion to comment upon.* Under these circumstances, while we can well appreciate why respondent should desire to hide the fact, we fail to understand why respondent does not realize the futility of the attempt to do so.

Also, we cannot pass without challenging the gratuitous statement in respondent's brief (p. 4), that the stipulation by which the careful and extensive opinion of the District Court was accepted as the findings of fact and conclusions of law in the case, was—"merely for petitioner's

* See the cases cited in footnotes 1 and 2, page 3 of our main brief, where these facts were before the Court. These cases have been cited by this Court, *e. g.* *American Developments Corp. v. Carbice Corp.*, 283 U. S. 27. This subject matter, evidencing knowledge by this Court, is discussed in the minority opinion in *General Talking Pictures Corp. v. Western Electric Co. et al.*, 304 U. S. 175.

convenience and at its request".* The absurdity of this statement is best demonstrated by the fact that petitioner was the successful litigant in the District Court, the bill of complaint as to all patents having been dismissed for "want of equity" (Vol. II, p. 1158). Further proceedings in the cause were had solely by *respondent's* appeal. We can conceive of no circumstance by which *petitioner's* "convenience" could have been or was served in any respect, and respondent states none.

Respondent's discussion of prior commercial forms of directive antennas (Brief pp. 6-10).

Respondent starts its discussion of this subject by recognizing that the problem of directive wireless signalling was one of the oldest in the art. Reference is made to Brown's work in 1899, and then to the Marconi beam structure which is characterized (p. 7) as

"highly directive, and very efficient for concentrating the radiated energy in the direction for which it was intended."

This forms an interesting background to a consideration of the opinion of the Court of Appeals below, which was predicated upon the belief (Vol. II, p. 1168, fol. 1042) that no successful use of directional wireless occurred "until antennas made under the patents here to be considered were built".

By reciting that the Marconi beam antenna cost \$175,000; the Models B and C antennas, \$30,000 and \$40,000 respectively; and the Model D antenna, \$5,000, respondent seeks to imply, without the direct assertion, that the Carter patent is responsible for these enormous savings.

* Italics ours throughout unless otherwise stated.

It is significant that throughout this discussion respondent takes pains to avoid any reference to the prior V-antenna structure of the second Lindenblad patent.

The Lindenblad V-antenna, and not the Marconi beam, or even Models B and C, is the bench mark from which must be measured any alleged saving in costs by the Carter antenna structure. Since, concededly, the only possible difference between Carter and Lindenblad is in *the angle of the V*, there can be no difference in cost between them. Mere comparison of Figs. 1 and 2 of the Lindenblad patent with Fig. 2b of the Carter patent will demonstrate this.

**The alleged success of the Carter Model D Antenna
(Brief p. 10).**

Petitioner does not question that respondent had in operation an antenna which it identified as Model D, but that does not prove commercial success for the Carter patent.

Respondent says that the most "casual" inspection of Carter's description of the Model D antenna shows that it is the antenna of the Carter patent. *Only* a "casual" inspection would convey that idea; a *careful* inspection reveals their fundamental differences.

The patent, on the one hand, is *expressly* directed and confined to radiation *in the plane of the wires on the bisector of the V*. This can be accomplished only by the use of the Abraham formula, and by avoiding ground effect, which alone is responsible for radiation *at an angle* to the plane of the wires. Respondent concedes this on page 15 of its brief, but strenuously denies it later (p. 26). The patent itself points out (*e. g.* Vol. II, p. 501, line 24) that radiation at an angle is "undesired" and is avoided.

As distinguished from this, the commercial Model D antenna of respondent, described in the I.R.E. article, does *not* radiate in the plane of the wires (see for example Fig. 48, Vol. II, p. 593).

It will be seen, therefore, that respondent itself does not employ the Carter patent in its commercial operations, and rather than constituting support for the patent, the commercial Model D antenna, which respondent stresses, is an emphatic and most convincing condemnation thereof.

**Respondent's discussion of the Carter Patent in suit
(Brief pp. 12-18).**

We first note that respondent admits (p. 13) that the radiation phenomenon, with which the patent in suit is concerned, had been known since Abraham's articles of 1898 and 1901. However, respondent makes the erroneous assertion that in the Abraham articles "the wire is assumed to be 'in free space'." The implication is that because Abraham's work was entirely without reference to ground effect, Carter may have really done something worth while in applying Abraham's formula to ground conditions. Truly, respondent's memory was short in making this assertion. In the I.R.E. article (Vol. II, p. 559) Carter and his co-authors made the statement that in the Abraham article:

*"Abraham has treated the case of a grounded wire
• • • . Although the case of a wire free in space is
similar in many respects to the cases already treated,
it will nevertheless be analyzed in detail here."*

Thus, though respondent's brief asserts Abraham discussed only a wire "in free space", Carter, in his I.R.E.

article, asserted that Abraham discussed only a grounded wire. The truth is that Abraham considered *both* conditions; in his 1898 article a wire in free space, and in his 1901 and 1904 articles a grounded wire.

Respondent next (Brief, p. 14) directs attention to:

*"The first of the antennas of the Carter patent, the one shown in Figure 2b * * *."*

We ask the Court to compare this "Carter antenna" with the antenna of the prior Lindenblad patent (Vol. II, p. 486, Figs. 1 and 2). One of the questions this Court will be asked to decide is in what respect do the two differ? Respondent's brief suggests that the Carter antenna

"is a very simple structure, consisting of two wires, A and B, which in practice may be strung on telegraph poles 80 feet high (patent, p. 3, line 58, II, 501) and are connected by the wires 10 with the source of energy at the radio station."

Obviously the same is true, in every respect, of the Lindenblad V-antenna.

Respondent next discusses the drawings of the Carter patent. Figs. 1a and 1b represent prior practice, and it is stated (Brief, p. 15) that Fig. 4 contains a feature "*which is not used by petitioner*". Also it is stated (on p. 17):

"The remaining figures of the patent, except Fig. 12 (which is merely a graphical representation of the Abraham formula), relate to refinements which are not here involved; we see no need to discuss them."
(Matter in parentheses ours.)

Thus, the only antenna *structure* disclosed by the Carter patent which petitioner is charged with having appropriated is illustrated by Figs. 2a, 2b, and 2c. These figures differ from each other only in the manner in which the

transmission lines are connected to the antenna wires—a subject matter which was originally involved in suit with respect to patents not now remaining in the case, and with which claims 15 and 16 are in no way concerned. Therefore, these figures are materially the same as Figs. 1 and 2 of Lindenblad.

Finally, respondent's brief (pp. 17-18) makes the assertion that the Carter patent teaches the *optimum relation* of the angle between the wires, the lengths of the wires, and the wave length employed *for all finite lengths of wire*. This, of course, is not so, as we have pointed out in our main brief (pp. 19-21). But even if it were true, it would merely mean that although the Abraham formula can be correctly applied to wires an integral number of half wave lengths long, Carter used it for all *other* lengths, ignoring the errors that result from so doing. Can it be seriously or successfully contended that this amounts to an *invention*?

**Respondent's discussion of Petitioner's Antennas
(Brief pp. 18-21).**

While we have in our main brief, and elsewhere in this reply, explained in what respects petitioner's antennas differ from the Carter patent, one further remark is in point.

Figs. 1a and 1b of the Carter patent (Vol. II, p. 492) give the radiation pattern of the prior antennas. The significant fact is that the four main lobes of radiation *are at an angle to the plane of the wire*. Fig. 3 of the Carter patent (p. 494) illustrates the radiation pattern obtained by the Carter invention. Here it will be seen that the main lobes of radiation are *not* at an angle to the wire. To the contrary, they are geometrically con-

fined to the plane of the wires. This is consistent with the many statements in the patent, and with the testimony of respondent's expert that the invention of the Carter patent contemplated radiation *confined to the plane of the wires and on the bisector of the V*.

Let us next see, therefore, what is the radiation pattern of the prior Lindenblad V-antenna patent. Exhibits CC and DD (Vol. II, pp. 897-898) are such patterns, and are conceded to be correct by respondent (Brief p. 48). In these patterns the main lobes of radiation are *not* in the plane of the wires along the axis of the V, but, to the contrary, are at *a substantial angle* thereto. In this respect only do the patterns of the Lindenblad and Carter antennas differ. The main lobes of the radiation patterns of petitioner's antennas (Exhibits S and T, Vol. II, pp. 745-746) form substantially the same angles with the wires as in the Lindenblad antenna.

With these facts in mind, we direct the Court's attention to page 48 of respondent's brief where it is stated that Carter obtained *a new result*, as compared to what Lindenblad obtained; and that this new result was exemplified by the difference in the radiation patterns of the Lindenblad and Carter antennas. Obviously, therefore, Carter differs from Lindenblad *only* in the same respect that petitioner differs from Carter.

**Respondent's treatment of infringement
(Brief pp. 23-35).**

Respondent's discussion of this subject starts with an attempt to attach some importance to the fact that petitioner strings its antenna wires on poles 80 feet high, and that poles of that height were recommended in the Carter patent. Here, again, is an implication that petitioner

copied something from Carter. Such an implication is wholly unwarranted. Carter himself admitted (Vol. I, p. 430, fol. 602) that—

“The antennae were constructed on 80 foot poles. They were the standard size poles obtainable; we had a large number of those poles at Rocky Point; we had been using them before that. They are the standard size for telegraph poles. I believe you are right in stating that the longer-sized poles come from the West Coast; for that reason an 80 foot pole is what is ordinarily used here in the East, because of the expense incident to getting taller poles.”

Naturally petitioner used the only available poles which were “standard-sized for telegraph poles ‘which were’ ordinarily used here in the East”. Moreover, it should be noted that petitioner’s antennas were constructed prior to the issuance of the Carter patent.

In the next paragraph (on p. 23 of its brief) respondent quotes from our main brief to the effect that the present litigation has to do solely with antenna structure (as distinguished from theory of operation). With this as a foundation, respondent argues that it is conceded by petitioner that the Carter patent is for a *structure*. Of course, no such concession has ever been made, and it is not the fact. The Carter patent is solely for a theoretical determination of an angle between the legs of a V-antenna in which radiation is confined to the plane of the wires along the bisector of the angle, and the *only* invention claimed by the two claims in suit is a *mathematical formula by which that angle can be determined*. There are numerous claims of the Carter patent which *are* directed

to *structure* (e. g. claims 36-41) which were originally charged to be infringed. As to those claims respondent has acquiesced in the decree of the District Court that petitioner's antennas do not infringe.

On page 26 of its brief respondent contends that the repeated references in the patent to radiation in the plane of the wires and on the bisector of the angle mean radiation "*in compass directions*". This is not what the patent says, and respondent advances no justification for thus misreading the patent.

Again, respondent seeks to avoid the consequence of the fact that petitioner's antennas radiate at a *substantial angle* to the plane of the wires, as distinguished from radiating *in* the plane of the wires, by saying that this happens in Carter also as "unavoidable effects of the presence of ground"—"*at a distance from the antenna*". The fallacy of this contention is that it is flatly contradicted by the patent itself. Figs. 6 and 7 of the patent are *power distribution* curves, and show precisely what happens *at all distances* (see specification p. 499, lines 89-93). These drawings illustrate that at *all* times, and at *all* distances *the radiation is confined to the plane of the wires and along the bisector of the angle between them* (see, also, respondent's brief, p. 15; and Hogan's testimony, Vol. I, p. 125, and p. 128, Q78 *et seq.*).

On pages 27 and 29 respondent attempts to excuse Carter for his failure to mention the "well known and inevitable effects of ground" by stating that "Carter did not think it necessary to analyze or describe" these effects. Obviously, neither this excuse nor this explanation is sufficient. Carter either did or he did not know of the effects of ground. We, of course, believe that he

did, for he was concededly an expert in his art. If we are correct in this belief, it is inconceivable that he would have subscribed to a patent specification and claim as his invention something not only wholly inconsistent with but contrary to ground effect, unless he believed that he had invented means to *avoid* ground effect. That, in the final analysis, is what the Carter patent is directed to, namely, *means for avoiding ground effect*. Indeed, it is only by this avoidance of ground effect, *whereby predominant radiation is maintained in the plane of the wires and concentrated along the bisector*, that Carter claimed any difference in function from the prior Lindenblad V-antenna patent, according to respondent's own assertion (Brief p. 48).

Under these circumstances, the authorities cited by respondent (Brief pp. 29, 31) are not in point.

It is true, as respondent states (Brief p. 33), that the Abraham formulas are correctly applicable only to wires an integral number of half wave lengths long, and it is here that respondent, *in italics*, heralds Carter's contribution of the empirical formula as something which gives "by direct solution, the desired angle and gives it *not only for the limited condition to which the Abraham formulas are applicable* (integral half wave length wires) but also for *all other wire lengths*". As we have already pointed out and here repeat, *this is refuted by the patent itself*, and illustrates the fundamental fallacy of respondent's theory of the Carter patent. It is a matter of simple logic that if the *exact* formula will not apply to wire lengths other than an integral number of half wave lengths, surely an *empirical* statement of the formula could not do so.

Respondent's contentions as to the rule of *Adamson v. Gilliland* (Brief pp. 35-37).

Respondent attempts to avoid the effect of the rule by asserting that the findings of the District Court were "*all*" merely "*interpretation of written documents*"; that the District Court erroneously interpreted the documents and was corrected by the Court of Appeals.

It is significant that respondent does not question the fact that there *was* "testimony consistent with the finding" made by the District Court, which fact alone, under the rule, made the finding "unassailable".

However, as a matter of fact, there is no justification for respondent's assertion. In arriving at his conclusions in this case it was necessary for the District Judge to make findings on the structure and operation of petitioner's antenna; the technical or scientific differences between the disclosure of the Carter patent and the patents of the prior art; the correctness or incorrectness of the applicability of the Abraham formula (or its empirical restatement by Carter) to wire lengths other than those an integral number of half wave lengths long; the technical and scientific effect of Carter's amendment to his specification in his eleventh-hour attempt to include petitioner's antennas; and the scientific effect of whether or not an antenna system which confined its radiation to within the plane of the antenna wire was practical, useful or had ever been commercially utilized. Clearly, none of the District Court's findings on these controlling matters was based or could have been based solely on "interpretation of documents". These were all findings of fact, and it would have been impossible for the Court to have disposed of the case without making them.

Therefore, if the rule of *Adamson v. Gilliland* is not applicable to the present case, it is difficult to conceive of a case to which it would be applicable because, in all patent infringement cases, the issues decided by the Court are validity and infringement, which always require the construction of printed patents, publications or other patent documents.

Respondent's discussion of Carter's unlawful expansion of his application (Brief pp. 37-41).

As pointed out in our main brief, pages 38, 39, the Carter application as filed and the patent as issued are expressly directed to a *standing* wave antenna system. This was one of the respects in which Carter sought to differentiate from the disclosure of Figures 3 and 5 of the prior Lindenblad V antenna patent, which figures showed a *traveling* wave system. (Figs. 1 and 2 of that patent show *standing* wave antennas.)

As there pointed out, as well as in footnote 8 of respondent's brief, page 12, the wires of a *traveling* wave antenna are, in electrical parlance, of *infinite* length. As distinguished from this, the wires of a *standing* wave antenna are electrically of *finite* length.

Thus, when Carter filed his application for patent, he used the word "finite" to emphasize that *his* antenna was of the *standing* wave type. He did not and could not have used it in any other sense because a *physically* infinite wire would be an impossibility. Respondent's contention that this word as thus used by Carter meant wires of *any* length is belied by the context in which it is used. Thus, in the first paragraph extracted by respondent from the Carter application, it is expressly stated that the object

of Carter's invention was to disclose the proper angle for conductors "either an even number of half wave lengths long or an odd number of half wave lengths long", and then, *to emphasize the fact that his invention was confined to a standing wave antenna*, he proceeded to say "and, in general to disclose the angle for best directional propagation for wires of any *finite* length". This could mean only wires an even or an odd number of half wave lengths long that are *electrically finite*, as distinguished from *electrically infinite*. If Carter really meant *every* wire length, as respondent contends, why did he so meticulously refer in the same sentence to the number of odd and even half wave lengths?

It is obvious that Carter contemplated any standing wave antenna, regardless of the length of the wires, *provided they were an even or an odd number of half wave lengths long*; in other words, wires *electrically finite* in order to be a *standing wave antenna*, and of the integral number of half wave lengths in order to enable the Abraham formula to determine the correct angle.

As contrasted with this, the corresponding paragraph of the patent, after the illegal amendment thereof, *has had deleted therefrom this controlling language*, so that the patent now states that the invention is directed to *all lengths of antenna wires in a standing wave system*.

In view of the foregoing, it will be apparent that the remainder of the quotation from the Carter application (Brief, p. 39), where it refers to wires "of any length whatsoever", merely means wires an integral number of half wave lengths long, regardless of how many half wave lengths are employed. This is emphasized by the fact that in connection with that statement the application as filed

expressly stated that the law giving the correct angle for lengths *between* odd and even number of half lengths is *not given "due to its complexity"*.

In conclusion on this subject, we point out that the only passage of the patent which definitely asserts that wire lengths *between* half wave lengths are included within the patent is the paragraph contained between lines 35 and 43, page 4 of the patent (quoted in footnote 19, page 19 of our main brief). *This is nowhere denied by respondent.* But this entire paragraph was inserted in the application after the filing of the original bill of complaint in this case. The language of this paragraph is simple. Carter found no difficulty in expressing its thought *after* he was aware of the desirability or necessity of doing so, although, as is revealed by the file wrapper, he had considerable difficulty in convincing the Patent Office Examiner of the propriety of such expansion (see Vol. II, p. 1121).

Under these circumstances, it is pure sophistry on the part of respondent to assert, as it does in italics (Brief, page 40), that if the patent had issued *exactly as filed*, it would have described and claimed petitioner's antenna. If this were true, there would have been no necessity for amending the Carter application after its allowance, and after respondent had become familiar with petitioner's antennas. It is significant, therefore, that respondent offers no explanation why this occurred.

**Respondent's consideration of the prior art
(Brief pp. 41-49).**

In its discussion of the Abraham articles respondent advances as one of its varying definitions of the Carter invention the empirical formula which is stated to be applicable whether or not the length of the an-

tenna wire is made up of an exact multiple of half wave lengths, whereas the Abraham formula would correctly apply *only* to wires of that exact length. If this, in fact, constitutes Carter's sole contribution to the art, it certainly is not what is advanced by the patent, and it certainly constitutes no invention.

If the *correct* formula is inapplicable to wires other than those an exact multiple of half wave lengths, certainly the *empirical* statement of that formula could not apply any better. Moreover, the Carter patent states on its face that it does *not* purport to give the formula for wires of lengths between integral numbers of half wave lengths "due to its complexity"; and it is significant that throughout his patent Carter claims the Abraham formula in its original as well as in its empirical form *as meaning the same thing*. As Kelley demonstrated by means of Exhibit W (Vol. II, p. 820), for all practical wire lengths, and certainly all those with which this case is concerned, Fig. 12 of the Carter patent would be the same whether the Abraham formula or the empirical formula was used to plot the curve.

Finally, we ask the Court to compare the claim *here* made by respondent's brief for the Carter patent with the statement at page 53 thereof that "Carter did not patent or attempt to patent any formula"; he "merely utilized the Abraham formulas in mathematically analyzing and explaining a theory of results he got from his new structure."

Respondent seeks to avoid the anticipating effect of the French Bethenod and Levy patents with the statement (Brief pp. 44, 45) that they show *networks*, and hence are not relevant to the Carter patent. That this is no distinction is evident from the fact that the Carter patent discloses similar networks when illustrating the preferred forms of his alleged invention (see Figs. 4 to 11, Vol. II, p. 494).

Respondent also says that the Bethenod patent fails to disclose the Carter invention because he does not disclose "long" wires. That is not true. Bethenod employed wires as long as Carter. Respondent itself points out (Brief p. 43) that the Bethenod patent—

"discloses an admittedly old type of long wave antenna".

Long wave antennas (as made apparent from respondent's footnote 7, p. 12) were all electrically *long* as compared to short waves.

Thus, in the only two respects that respondent seeks to differentiate Carter from the prior art, no differentiation in fact exists.

As to the second Bethenod patent (Brief p. 44) respondent conveniently omits all reference to the ground effect, just as the Carter patent does. If the Carter patent can be construed to cover an antenna system which operates *because* of ground effect, then this Bethenod patent becomes a complete anticipation because the ground constitutes the other antenna wire.

**Respondent's consideration of the prior Lindenblad
V-Antenna Patent (Brief pp. 46-49).**

While this subject has been heretofore covered in considerable detail (*ante*, pp. 5, 7, 9), we wish briefly to refer to respondent's argument made on these pages.

Respondent asserts that

"Lindenblad did not consider the angle between the wires to be of importance".

and that Lindenblad recommended

"an angle of about 12°, regardless of wire length and wave length" (Brief p. 47)

which respondent exaggerates into a *fixed*

"half angle of just under 6° " (footnote 27, p. 34).

This is untrue in its entirety. The Lindenblad patent is *not* for a *fixed* angle, nor does it recommend, with respect to its *standing* wave antenna disclosure, *any* angle other than what may be desired to be used between 0° and 180° to obtain radiation in the plane of the wires along the axis of the V, just as in Carter.

The only support for its erroneous assertions that respondent finds is quoted on page 47 of its brief. This quotation is advanced as the *beginning of a sentence* allegedly appearing at lines 115 to 119 on page 2 of the patent (Vol. II, p. 488). This is a misrepresentation. *What is quoted is extracted from the middle of a sentence.* The whole sentence does not support the assertions. The entire quotation is as follows:

"Since the preferred radiation is from the travelling wave, and is due to the expansion of the lines of force between the current charges travelling along the conductors, the divergence should preferably be fairly gradual, and the spacing at the open end, while variable over a great range, should be in the neighborhood of a fifth of the length, and the length of each antenna section should be of the order of magnitude of five to ten waves long."

For the convenience of the Court we have emphasized the portions of the sentence *which respondent ignored and failed to reproduce.* Thus, reading the entire sentence, it will be seen that the first part thereof which respondent omitted, shows that Lindenblad was referring exclusively to the *travelling* wave antenna structures of his Figs. 3 and 5, as to which the entire sentence would be correct; and that

it had nothing whatever to do with the *standing* wave structure—viz: the structures of his Figs. 1 and 2 with which alone we are here concerned—as to which both the entire sentence *and* the portion thereof quoted by respondent, would be wholly incorrect. Moreover, the last part of the sentence which respondent omits from its quotation, makes it quite evident that Lindenblad realized the necessity of correlation between angle and wire length, whereas respondent's mere assertion that Lindenblad had no such knowledge is the sole reason advanced by respondent why Lindenblad was not a complete anticipation of Carter (see, for instance, respondent's brief, p. 32).

It is true, as respondent comments (Brief p. 48), that the Carter patent was allowed over the Lindenblad patent which was cited by the Patent Office Examiner, but respondent fails to point out that this allowance was secured only by insisting that Carter supplied the *exact* angle, whereas Lindenblad did not. By the present suit respondent seeks to cover antennas which do *not* use the "exact" angle, and has induced the Court of Appeals below to construe the Carter patent as covering a *range* of angles. Neither the specifications nor the claims give any indication of what this *range* should be. The Lindenblad patent was advanced to the Patent Office, and to the Courts below in the present case, as covering *all* angles from 0° to 180° . Thus, in the prosecution of the Lindenblad patent, as will be seen from its file wrapper (Vol. II, p. 1002), it was stated—

"The present invention is not limited in scope to any gradual divergence or convergence since it covers a wide range of departure from the parallel condition of two straight wires, *this range extending up to, but not including the well known 180 degree spaced dipole antenna.*"

Therefore, if the Carter patent covers a *range* of angles, as respondent now asserts, and as was held by the Court of Appeals below in order to make petitioner's antennas infringements, the patent is fatally defective for want of sufficient disclosure, and for want of sufficient definition and limitation of its claims. In *General Electric Company v. Wabash Appliance Corporation*, 304 U. S. 364, this Court held the Pacz patent invalid, *inter alia*, because the specifications and claims failed to define the necessary size of tungsten grains so as to set forth the limits of the monopoly as required by the Statute. Here the situation is even worse. The Carter patent *does* specify that the advance made over Lindenblad is the determination of a *precise* angle, and respondent is seeking to expand the monopoly granted for that *precise* angle determination so as to cover a *range* of angles of which neither the upper nor the lower limit is stated in the patent, nor by the Court of Appeals below, nor by counsel for respondent, nor by anyone else.

Another flagrant misuse of the evidence is contained in footnote 38 of respondent's brief (p. 48). Petitioner's expert was testifying in connection with Exhibits CC and DD (Vol. II, pp. 897, 898), which apply to the Lindenblad patent. That patent was advanced by respondent as covering a V-antenna, regardless of the angle. Defendant proved that not *all* of the angles between 0° and 180° would result in predominant radiation along the axis of the V, and that, therefore, the Lindenblad patent was invalid as too broadly claimed, V-antennas being old in Bethenod, Levy, etc. Exhibits CC and DD were instances, mathematically evolved and not questioned as to accuracy, of *particular angles* where predominant radiation would *not* be effected along the axis; and Kelley's testimony, quoted in respondent's footnote, is with respect to those two instances. Now, how-

ever, respondent quotes Kelley's testimony in support of an argument, the implication of which is that *all* radiation effected with the Lindenblad V-antenna is at an angle to the axis of the V, and that it is in *this* respect that Carter differs from Lindenblad.

**Respondent's treatment of the prior work of
Bruce (Brief pp. 49-51).**

Contrary to respondent's remarks, petitioner has not "abandoned" Bruce as a prior inventor. In the trial of the case the Bruce evidence was of particular importance because petitioner was charged with infringement of *seventeen* claims of the Carter patent, and the evidence of Bruce's prior work was an important factor in leading the District Judge to the correct conclusion that none of these claims was infringed by petitioner's antennas. By respondent's acquiescence in the decree of the District Court as to *fifteen* of these claims, we are now concerned only with claims 15 and 16, the sole "inventive" feature of which is Carter's empirical statement of the Abraham formula. It was not considered necessary, therefore, to mention Bruce's work in our petition for a writ of certiorari. In accordance with this Court's decision in *General Talking Pictures Corp. v. Western Electric Co., et al.*, 304 U. S. 175, in addition to regarding it as unnecessary, we considered a detailed discussion of the Bruce evidence improper.

However, since respondent goes into the subject, we must point out that on September 28, 1926—*four years prior to the application for the Carter patent in suit*, and within a few months after Bruce started his investigations (in May, 1926)—he plotted out what we may term a "rule-of-thumb" application of the Abraham formula as applied

to V-antennas (Exhibit JJ, Vol. II, p. 902) which, as Kelley demonstrated (by Exhibit W, p. 820), meant the same thing as Fig. 12 of the Carter patent. It was on the strength of this that the District Court found, quite correctly, that petitioner's antennas differed from Carter to as great an extent as Carter differed from Bruce. Therefore, under an elementary rule of law, if petitioner's antennas infringe the Carter patent then, inevitably, Bruce anticipates.

**Respondent's treatment of "specific matters" in
petitioner's brief (pp. 51 et seq.).**

Under this heading respondent discusses ten enumerated points. Our reply, for ready identification, will be identified by the same numerals.

(1) Respondent endeavors to escape the significance of the statement in the Carter patent that when it is *desired* to radiate *at an angle to the horizontal plane of the wires*, it is necessary to tilt the wires from their horizontal position to the required angle so that the wires will be tilted in the direction of desired radiation, because the Carter antenna always confines its radiation to the plane of the wires. However respondent insists—

"This is *not* what the patent says" (emphasis respondent's) and, further, that the patent merely says to tilt the antenna—

"towards the direction in which the beam of energy is to be propagated".

There is thus raised a simple issue of fact. Let us see, therefore, just what Carter claims by his patent with respect to this feature.

We direct the Court's attention to claims 26, 27 and 29 in which it will be seen that Carter expressly *claims* as his

invention the feature that when radiation is desired at an angle to the horizontal, the wires must be

“placed in a plane at an angle to the horizontal, said plane extending *in* the direction of transmission.”

(2) Here respondent endeavors to avoid the effect of Carter's admission in his subsequent patent that the patent in suit, by its very subject matter and alleged invention, intentionally disregarded ground and sought to avoid the effects thereof. That is the point we made in our main brief, and respondent avoids meeting it in any respect.

(3) It is here that respondent asserts that what Carter invented was an antenna and not a formula. We have covered this matter fully earlier in our reply (*ante*, pp. 2, 3, 17).

(4) Respondent in this paragraph misstates our position. We at no time have stated, or here state, that Carter's empirical formula is *wrong*. All we say, and it cannot be successfully denied, is that the empirical formula can have no greater accuracy as applicable to any physical conditions than can the original formula from which it was derived. Indeed, as we have shown (*ante*, p. 17) Carter's empirical statement of Abraham's formula is identical with the Abraham formula when applied to all wire lengths with which this litigation is concerned.

(5) Here respondent asserts that petitioner's antennas are not the old V-type antenna structures, assertedly because no prior art shows a single description of a V-antenna employing the coordination of elements taught by Carter. This is amazing. We assume that what respondent refers to is the exact angle for a V-antenna structure formed of wires an integral number of half wave lengths long determined by the Abraham formula. The prior Lindenblad V-antenna

patent discloses all of these elements in this identical "coordination", unless there is legal justification for Carter to assert that by his utilizing an *exact angle* somewhere between 0° and 180° , he is different from Lindenblad. If that difference entitles Carter to a valid patent, and we submit that it does not, then petitioner does not infringe because, concededly, none of its antennas employs that *exact angle* for the antenna wire length utilized. If the Lindenblad patent covers all angles from 0° to 180° , how can Carter validly monopolize any angle or range of angles that is determined by the simple application of a scientific formula which was published thirty years before for the express purpose of determining *any* desired angle? These questions are particularly pertinent in the present case where no limits for the range are given or even suggested.

(6) Kelley, on direct examination, stated that petitioner's antennas were "intentionally" and "deliberately" designed so as to radiate at an angle to the plane of the wires as distinguished from Carter's radiation in the plane of the wires. Clearly, with knowledge of the structure and functioning of the antennas, and of the far more efficient results obtained thereby, any expert in this art would know that such functioning was deliberate and intentional, and this is precisely what Kelley testified to in the very passages of his testimony from which respondent has again extracted one short statement, and has ignored the remainder which completely refutes the purpose for which respondent uses the short statement (see Vol. I, p. 269, XQ-1063 to XQ-1088).

(7) In this paragraph respondent denies our assertion that the Carter patent is a "paper patent", as we have amply demonstrated and as the District Court found. It is only the Carter invention exemplified in Figs. 2a, 2b

and 2c that petitioner is charged with having appropriated; *and there is not one word of evidence in the case that respondent has ever constructed or commercially utilized an antenna in accordance with any of these figures.*

(8) On reaching the present stage of its brief, and realizing that in the preceding pages it has discussed the conflicting testimony on which the "findings" of the District Court were based, respondent makes the assertion that the "findings" of the Trial Court were "chiefly" interpretations of written documents, and denies the applicability of the rule of *Adamson v. Gilliland*.

(9) To determine the number of witnesses who testified in the case it is merely necessary for the Court to refer to the index of Volume I of the record.

(10) In this concluding paragraph respondent admits that the "reflector effect", which alone distinguishes claim 16 of the Carter patent from claim 15 thereof, was known many years prior to Carter. With this admission we have nothing to add to our discussion of this subject and the applicable authorities given in our main brief (p. 42).

Conclusion.

The Carter patent is neither valid nor infringed, wherefore the decree of the Court below should be reversed as to the Carter patent.

Respectfully submitted,

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